

Remarks

Reexamination and reconsideration of rejections are hereby requested.

Claims 1-61 are pending. Claims 1-59 and 61 are rejected and claim 60 is objected to. Claims 1 and 30 are being amended herein.

Claims 1-3, 5-8, 10-13, 30-32, 34-37 and 39-42 stand rejected under 35 U.S.C. § 102(b) as anticipated by Black et al, U.S. Patent No. 4,096,579. Claims 4, 9, 14-29, 33, 38, 43-59 and 61 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Black, et al '579 in view of Singhose, et al U.S. Patent No. 5,638,267. In response to this Office Action, claims 1 and 30 have been amended.

The present invention is directed to technology allowing the use of a position-velocity (PV) table and either a shaped velocity command or trajectory to control movement of a dynamic system such as a data storage device to reduce mechanical and/or acoustic unwanted vibrations. Although some disk drives rely on PV tables to determine their inputs, the inputs can result in unwanted vibrations to the systems. The techniques presented and claimed in the present application reduce and/or limit such vibrations. In particular, independent claim 1 is directed to a control method including shaping a velocity command determined using a PV table to reduce unwanted vibrations. Independent claim 6 is directed to a control method including generating and storing a trajectory, and defining a system velocity in terms of system position and one or more additional variables, in a PV table having $N > 2$ dimensions. Independent claim 10 is directed to a control method including generating and storing a plurality of such trajectories and independent claim 14 is directed to a control method wherein the trajectory-generating step

generates the trajectory in accordance with a technique for reducing unwanted dynamic system vibrations. Independent claim 59 is directed to a method for generating a PV table by storing a trajectory generated by integrating a partial fraction expansion equation model of the dynamic system. Independent claims 30, 35, 39 and 43 are directed to apparatus embodying the novel techniques set forth in claims 1, 6, 10 and 14 respectively.

U.S. Patent No. 4,096,579 to Black discloses velocity control apparatus for a disk drive. Black teaches that prior art disk drives used read-only memories as lookup tables in order to generate velocity commands for different distances remaining to be traveled. He states that the prior art devices required that the output of the table would have to be selectively attenuated a desired amount such as with precision resistive networks. Black acknowledges that the prior art systems worked reasonably well but states that his goal is to provide an even more efficient and reliable velocity control system capable of generating velocity command signals defining any one of a plurality of velocity trajectory curves directly from the memory storage device itself thereby to avoid the necessity of precision resistive networks and their incumbent disadvantages.

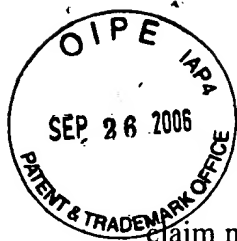
Importantly, Black does not recognize that unwanted vibrations may be present in a disk drive system. While Black suggested at column 3, line 8, shaping a velocity signal, this shaping smoothes a stepped approximation of an optimum velocity versus distance curve to more closely approximate the optimum curve. This shaping does not prevent or reduce unwanted vibrations. Because Black does not disclose shaping the velocity command to reduce unwanted vibrations claim 1, as amended herein, is not anticipated Black.

Independent claim 6 is directed to a method for generating a trajectory for inclusion in a position-velocity table that is used to control a dynamic system. Claim 6 includes the step of

storing the trajectory in a position-velocity table having $N > 2$ dimensions. It is submitted that such teaching is lacking in Black and therefore claim 6 is not anticipated by Black.

Claim 30, like claim 1, has been amended to recite that the velocity shaping reduces unwanted vibrations and therefore is not anticipated by Black. Independent claim 39 includes a limitation of generating a plurality of trajectories defining velocity in terms of position with the plurality of trajectories being generated in accordance with at least one system variable. It is submitted that at least this limitation in independent claim 39 is lacking in Black.

Claims 4, 9, 14-29, 33, 38, 43-59, and 61 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Black in view of Singhose. On page three of the Office Action the examiner states that "Black et al is silent on the trajectory technique with reducing of the unwanted vibration in the system." By this statement, it appears that the examiner is implying that Black was aware of unwanted vibration in his system but merely did not disclose a trajectory technique for dealing with it. This statement is misleading. As discussed above, Black never recognizes that there might be unwanted vibrations or dynamics as a result of his control of the head in a disk drive system. Because Black was unaware of, and silent with respect to, unwanted vibration there is absolutely no motivation for one of ordinary skill in the art to look for a reference such as Singhose that deals with reducing unwanted vibrations in a dynamic system. It is submitted that the examiner is making an impermissible hindsight reconstruction based on the teaching in the present application that moving the head in a disk drive from track to track can result in unwanted vibrations. Again, there is not the requisite motivation for one of skill in the art to combine Black with a shaping reference such as Singhose. It is therefore submitted that the 35 U.S.C. § 103(a) rejections are inappropriate and reconsideration is requested.



It is noted that claim 60 is indicated to be directed to allowable subject matter and this claim may be rewritten into independent form at a later stage is necessary.

For the foregoing reasons, it submitted that the pending claims, as amended herein, are in condition for allowance and early favorable action is requested.

Please credit any overpayment and/or charge any additional filing fees required under 37 CFR §§ 1.16 and 1.17 to our Deposit Account Number 03-1721.

Respectfully submitted,

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